

Student Name:

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University of Bahrain

Department of Computer Science

College of Information Technology

ITCS242: Assembly Language Programming

Quiz #1: Data Representation & Architecture

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**SHOW DETAILED WORK on the sheet back PLEASE!!!**

- 1) Name 2 types of addresses used in computers: Symbolic  
and physical Logical.
- 2) The CPU consists of 3 main components, name any 2 of them:  
Arithmetic & Logical unit and Registers
- 3) The offset value of the next instruction to be executed is stored in EIP register, and segment value of the next instruction to be executed is stored in CS register.
- 4) The flag used to select the regular/single-step execution mode is trace. The flag that indicates whether the operation result has odd or even number of ones is parity.
- 5) Using 8 bits show how the computer stores +79 0100 1111  
and -79 1011 0001.
- 6) The largest signed decimal number that can be stored in 16 bits is  $+2^{16-1} - 1$ .  
The smallest signed decimal number that can be stored 16 bits is  $-2^{16-1}$ .
- 7) The binary number 10101110 is equivalent to unsigned decimal value 174  
and signed decimal value -82.
- 8) If a computer has 32 address lines and 24 data lines, the maximum size of directly addressable main memory is  $2^{32}/2^8 = 2^{24} = 16,777,216$  Mbytes.
- 9) In real-address mode, the logical address 2F9C:7AF8 is converted to the physical address  
 $2F9C \times 10 + 7AF8 = 374B8$ .
- 10) Using 8 bits to store numbers show how the computer performs the operation  $(27 - 62)_{10}$ .

$$\begin{aligned} 27 &\Rightarrow 0001\ 1011 \\ 62 &\Rightarrow 0011\ 1110 \\ -62 &\Rightarrow 1100\ 0010 \end{aligned}$$

$$\begin{array}{r} 0001\ 1011 \\ + 1100\ 0010 \\ \hline 1101\ 1101 \end{array}$$



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11) The computer components are connected using 3 types of busses, name any 2 of them:

Address bus / data bus and Control bus.

12) The logical address consists of the following two parts:

Segment value and offset value.

13) The instruction operands may be located in many places, name any two:

CPU registers and Main memory location.

14) The addresses used by programmers are called Symbolic.

The addresses that travel on the address bus are called Physical.

15) Using 8 bits show how the computer stores +93 0101 1101

and -93 1010 0011.

16) The largest signed decimal number that can be stored in 20 bits is  $+2^{20-1} - 1$ .

The smallest signed decimal number that can be stored in 20 bits is  $-2^{20-1}$ .

17) The binary number 11001011 is equivalent to unsigned decimal value 203

and signed decimal value -53.

18) If a computer has 24 address lines and 32 data lines, the maximum size of directly addressable main memory is  $2^{24}/2^{20} = 2^4 = 16$  Mbytes.

19) In real-address mode, the logical address 3CEB:5F77 is converted to the physical address

$3CEB * 10 + 5F77 = 42E27$ .

20) Using 8 bits to store numbers show how the computer performs the operation  $(43 - 87)_{10}$ .

$$\begin{array}{r} 43 = 00101011 \\ 87 = 01010111 \\ -87 = 10101001 \end{array} \quad \begin{array}{r} + 00101011 \\ 10101001 \\ \hline 11010100 \end{array}$$